

**PCT**WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau

## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup> :</b> <b>A61K 7/00</b>	<b>A2</b>	<b>(11) International Publication Number:</b> <b>WO 99/37274</b> <b>(43) International Publication Date:</b> 29 July 1999 (29.07.99)
<b>(21) International Application Number:</b> PCT/US99/01385 <b>(22) International Filing Date:</b> 21 January 1999 (21.01.99)  <b>(30) Priority Data:</b> 09/010,736 22 January 1998 (22.01.98) US  <b>(71) Applicant:</b> INTERNATIONAL FLORA TECHNOLOGIES, LTD. [US/US]; 1151 North Fiesta Boulevard, Gilbert, AZ 85233-2238 (US).  <b>(72) Inventors:</b> ARQUETTE, Demetrios, James, G.; 434 E. Larkspur Drive, Tempe, AZ 85281 (US). BROWN, Jim; 5214 E. Paradise Drive, Scottsdale, AZ 85254 (US). REINHARDT, John; 1652 Kingsport Drive, Riverside, CA 92506 (US).  <b>(74) Agent:</b> VIKSNINS, Ann, S.; Schewgman, Lundberg, Woessner & Kluth, P.O. Box 2938, Minneapolis, MN 55402 (US).		<b>(81) Designated States:</b> CA, JP, MX, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>Without international search report and to be republished upon receipt of that report.</i>
<b>(54) Title:</b> DRY EMOLLIENT COMPOSITIONS  <b>(57) Abstract</b>  Dry-feel emollient composition additives comprising jojoba oil based esters have use in personal care, cosmetic, cosmeceutical and pharmaceutical products. The composition is essentially solid at room temperature, can be provided in various shapes and sizes (especially as particulates such as spheres), and can be produced from combinations of fatty alcohols, isopropyl esters and wax esters obtained from the oil contained in the seed of the jojoba plant ( <i>Simmondsia chinensis</i> ), jojoba oil. These new compositions also increase the range of applications for cosmetic compositions through an emollient that is more polar and hydrophilic than is found in jojoba oils (which may also be referred to in the art as jojoba wax esters). The compositions comprising fatty alcohols, isopropyl esters and jojoba wax esters (jojoba oil) may be obtained by a novel process of a base catalyzed alcoholysis reaction between jojoba oil and an alcohol, such as isopropyl alcohol. These esters, whether exclusively jojoba esters or when combined with other carrier and vehicle components (including other emollients or binders) can form excellent carrier and vehicle or delivery compositions for use in the cosmetic, personal care and/or pharmaceutical field, including the cosmeceutical field where cosmetic compositions also provide pharmaceutical or other therapeutic benefits. Typical materials with which the jojoba esters may be blended in accordance with the practice of the present invention include, but are not limited to, cosmetic oils and waxes, both natural and synthetic, including hydrogenated or partially hydrogenated oils, silicone oils, mineral oils, long chain esters, vitamins (especially vitamin E), long chain fatty acids, alcohols, cosmeceuticals, pigments, botanical extracts, esters and ethers, dimers, trimers, oligomers, and polymers, and the like. These blended compositions may of course be combined with the active ingredients intended to be delivered by the compositions used in the present invention. The proportions of the jojoba esters should be chosen to provide the dry-feel to the composition which is highly desired. This will usually require at least 10 %, often at least 20 %, preferably at least 30 %, more preferably at least 40 or 50 % by weight, and most preferably at least 60, at least 70, at least 80, and at least 90 % (up to 100 % by weight) by weight of carrier material (excluding solvent and actives) in the composition.		

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

## DRY EMOLLIENT COMPOSITIONS

This invention relates to emollient compositions for use in cosmetic,  
5 personal care and pharmaceutical preparations. The invention particularly relates  
to such emollient compositions and processes for their preparation, and more  
particularly to jojoba ester compositions which function as a dry carrier and vehicle  
for the delivery of actives such as fragrances, vitamins, medications, repellants, sun  
screens, cosmeceuticals (materials that combine a cosmetic and therapeutic effect)  
10 and the like.

### **BACKGROUND OF THE INVENTION:**

In the field of cosmetic, personal care, and pharmaceutical products  
emollients are usually defined as an agent that softens or smooths the skin and  
which tend to ~~reduce the roughness, cracking and irritation of the skin.~~ This  
15 smoothing is believed to be effected by the penetration of the emollient into the  
surface layers of tissue, through the slight congestion induced by rubbing and  
massage upon application, and especially through interference with sensible and  
insensible water loss. The ancient Greek physician, Galen, is thought to have made  
one of the first emollients consisting of beeswax, spermaceti, almond oil, borax and  
20 rosewater.

Emollients tend to be bland, fatty, oleaginous substances which may be  
applied locally to the skin, mucous membranes, or abraded tissue. One of the  
benefits of emollients is their ability to exclude water-soluble irritants, air, and air-  
borne bacteria when a layer of emollient is present. At the present, there are  
25 numerous ingredients which function as emollients in a wide variety of products,  
and which ingredients may act in subtly different ways. For example, certain  
emollients sit on the surface of the skin and serve to impede water loss from the  
skin. Such ingredients are generally comprised of large molecules that form a  
hydrophobic barrier to help prevent water from leaving the surface of the skin.  
30 Examples of such emollients are lanolin, mineral oil, silicone derivatives and  
petroleum jelly.

A chief use of emollients is to provide vehicles for lipid-soluble drugs (as  
in balms, ointments and alcohol-based liniments). Although it has often been  
suggested that such emollient vehicles facilitate the transport of such drugs through

the skin, it has been found that when the oil:water partition coefficient is greater than 1.0, the penetration of lipid-soluble drugs tends to be impeded. Emollient substances are commonly employed in cleansing and antiphlogistic creams and lotions. Compound ointment bases, creams, and other medical applications are also  
5 general areas of use for emollients. Amongst the more common emollient materials are castor oil, corn oil, cottonseed oil, rose water ointment, apricot kernel oil, avocado oil, grape seed oil, hazelnut oil, olive oil, sesame oil, theobroma oil, almond oil, myristyl alcohol, and recently other natural oils such as jojoba oil.

Other ingredients that have been used as emollients include a number of  
10 fatty acids derived from either plants or animal sources. Fatty acids generally comprise aliphatic hydrocarbon or other organic chains with carboxylic substituents on them, typically having between 8 and 24 carbon atoms in the chain backbone. Fatty acids are often used in ~~creams, lotions~~, shaving creams, lipsticks and as pressing agents in pressed powders and blushes. Fatty acids which are used in  
15 cosmetics formulations generally include at least stearic acid, oleic acid, myristic acid and palmitic acid. Other typical fatty acids include linoleic acid, behenic acid, and other common fatty acids of the general formula  $C_nH_{2n+1}COOH$ .

Fatty alcohols are also used as emollients. They are said to be less sticky and less heavy than many other fatty materials, such as the fatty acids, and are  
20 frequently used to improve the viscosity and stability of lotions and creams. They also have utility in reactive hair dying and perming products. Examples of fatty alcohols which find use in the field of cosmetics and personal care products are cetyl alcohol, lauryl alcohol, stearyl alcohol and oleyl alcohol.

Additional examples of emollients are fatty esters. One of the best qualities  
25 of fatty esters is that they do not feel as oily to the touch as some other types of emollient fatty ingredients. Examples include isopropyl palmitate, isopropyl myristate and glyceryl stearate. An important emollient is jojoba oil which is derived from the seed of the species *Simmondsia chinensis*. Jojoba is a seed oil with excellent skin feel. The oil is composed almost exclusively of wax esters, with little  
30 or no triglycerides present. A major portion of the production of jojoba oil is used by the cosmetic industry as an emollient in a variety of products.

The art of perfumery is an ancient skill with origins generally traced to the first Dynasty of Egypt, which was ruled by Menes sometime between 3500 and

500 BC. Sesame, almond and olive oils were used as solvents to extract the aromatics from vegetable materials and also as vehicles for delivery of the aromatics to the skin. Early Greek writers recorded the use of oils to "fix" or to retard evaporation of fragrance compounds. The early Romans showed little  
5 interest in perfumes and in fact perfumed unguents were forbidden in Rome by edict in about 188 BC. By the time Nero was Emperor in A.D. 54, the Romans had migrated into southern Italy and acquired a more intimate knowledge of the aesthetic side of life from the Greeks who occupied the area. Greeks and Romans used sesame, olive, or bean oils to extract and deliver the fragrance  
10 compounds and according to Pliny, resin and gum were added to "fix" the odor lest "it is apt to die away and disappear with the greatest rapidity if these substances are not employed." The first alcoholic perfume base appeared in 1370 and was known as "~~Hungary~~ Water," a name attributed to Queen Elizabeth of Hungary who first commissioned its preparation. The use of alcoholic bases  
15 to deliver fragrance compounds to the skin became the method of choice around the world. Some Middle Eastern regions still adhere to the more traditional use of sesame or olive oils as fragrance carriers.

Modern purveyors of perfumes and perfumed cosmetics have social and legal mandates to reduce the amount of Volatile Organic Compounds (VOC's) released  
20 into the atmosphere by their products. Modern technology has also identified alcohol as an agent which dries the skin and therefore there has been a desire for "alcohol free" cosmetic and personal care products. Additional carriers and vehicles for perfumes that are acceptable to the industry and consumers are also needed.

One of the problems with typical emollients is that the emollient itself provides  
25 a wet or oily feel to the applied areas. This can lead to an uncomfortable feeling or appearance to the user, which is very important in the cosmetic and pharmacological industry. An additive for cosmetic, personal care and topical treatment (medicament) products has been marketed under the name of "Confetti"<sup>TM</sup> (with different alphanumeric identifiers as to specific ingredients, e.g., Confetti<sup>TM</sup>  
30 AL with allantoin, and Confetti<sup>TM</sup> EA, MT, PA, RG and SG identifying the color of the material). This material is advertised as decorative microcapsules which contribute beneficial moisturizing and delivery of alcohol soluble ingredients to the skin. Confetti<sup>TM</sup> is advertised as having a good balance of structural integrity and

rub-in characteristics, rubbing into the skin completely without any extra pressure. The Material Safety Data Sheets (MSDS) on Confetti™ products identifies them as containing a natural oil (e.g., coconut oil, tocopheryl acetate, retinyl palmitate), propylene glycol, synthetic beeswax, petrolatum, allantoin, PVM/MA Decadiene crosspolymer and benzophenone, as well as pigments and/or dyes.

#### **SUMMARY OF THE INVENTION:**

Jojoba ester compositions have been found to function well as a dry carrier or vehicle for the application of active materials to the skin or hair of customers. These esters have been found to be useful in pure or blended forms as carriers or vehicles in the personal care, cosmetic, and/or pharmaceutical fields of use. The esters to be used may be provided with a range of properties (from the composition of the ester itself or from additives and blended materials) and can provide improved feel when used with other conventional carriers, vehicles, bases, actives and additives. Upon application and 'rubbing in' of the compositions, the jojoba ester based compositions leave the skin feeling soft (which is typical of high quality emollients), yet provide a mildly persistent coating which carries the actives without leaving a wet or oily feel to the skin of the user.

The present invention describes a very effective dry-feel emollient composition additive for use in personal care, cosmetic and pharmaceutical products and a novel method of producing that composition. The composition is essentially solid at room temperature, can be provided in various shapes and sizes (especially as spheres), and can be produced from combinations of fatty alcohols, isopropyl esters and wax esters obtained from the oil contained in the seed of the jojoba plant (*Simmondsia chinensis*), jojoba oil.

These new emollient compositions preserve the excellent skin feel attributed to jojoba oil, which has long been used as an emollient. These new compositions also increase the range of applications for cosmetic compositions through an emollient that is more polar and hydrophilic than is found in jojoba oils, (which may also be referred to in the art as jojoba wax esters). The composition forms stable emulsions much more readily than does jojoba oil. The composition may also further provide excellent emolliency to normally dry cosmetic systems involving high levels of pigments, with the emollient acting as a pigment wetting agent and as an aid to a

smooth and even application of the dry system. It also functions as an excipient in pressed powder.

The compositions comprising fatty alcohols, isopropyl esters and jojoba wax esters (jojoba oil) may be obtained by the base catalyzed alcoholysis reaction between jojoba oil and on alkyl alcohol. In the alcoholysis reaction, examples of the base catalyst materials include, but are not limited to metal alkoxides and especially alkali metal alkoxides, inorganic hydroxides, especially alkali metal hydroxides, and the like such as NaOCH<sub>3</sub> sodium methoxide, NaOCH<sub>2</sub>CH<sub>3</sub> sodium ethoxide (potassium, calcium and lithium counterparts), KOH & NaOH (e.g., anhydrous alkali metal hydroxides in alcohol solution, with the alcohol of the solution being the alcohol used in the reaction).

The fundamental reactions used in the practice of the present invention may be generally considered in the following manner. Starting materials could include:

I. The alcohol,

R<sup>4</sup>-OH (with isopropyl alcohol (IPA, HO-CH-(CH<sub>3</sub>)<sub>2</sub>) being primarily emphasized),

II. Jojoba Wax Esters



III. Fully hydrogenated Jojoba Wax Esters



wherein R<sup>4</sup> is an alkyl group or other aliphatic group, preferably of 1 to 12 carbon atoms, more preferably an *iso*-alkyl group, and most preferably an isopropyl group,

R<sup>1</sup> comprises CH<sub>3</sub> - (CH<sub>2</sub>)<sub>7</sub> - CH = CH - CH<sub>2</sub> - (CH<sub>2</sub>)<sub>x</sub> -, and

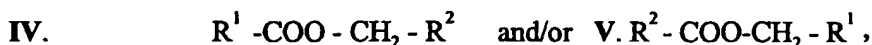
R<sup>2</sup> comprises CH<sub>3</sub> - (CH<sub>2</sub>)<sub>y</sub>-

wherein x is 6, 8, 10 and/or 12, and y is 16, 18, 20 and/or 22.

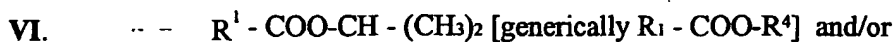
R<sup>4</sup> comprises C<sub>n</sub>H<sub>2n+1</sub>-, wherein n=1 to 12.

Typical product components from the preferred synthetic reactions used in the practice of the present invention with jojoba oil may include:

Partially saturated wax esters:



(Where isopropyl alcohol was used) *Iso*-propyl esters



Wax esters comprising

VIII.  $R^1CH_2-OH$  and/or IX.  $R_2CH_2-OH$ .

The basic reactions which may be used in the preparation of the emollient compositions of the invention derived from jojoba oil may include at least the following procedures.

**Reaction A** I and II<sub>n</sub> (catalyst) → VI, VIII and II<sub>r</sub>. This product is referred to herein as "Floraesters-IPJ" and is a liquid.

**Reaction B** I and III<sub>n</sub> (catalyst) → VII, IX and III<sub>r</sub>. This product is referred to herein as "Floraesters-HIPJ" and is a solid.

**Reaction C** I, and II<sub>n</sub> and III<sub>n</sub> (catalyst) → IV, V, VI, VII, VIII, IX, II<sub>r</sub> and III<sub>r</sub>. This product is referred to herein as "the broad melting range emollient" and the properties of the emollient depend upon the relative amounts of II<sub>n</sub> and III<sub>n</sub>.

The subscripts *n* and *r* respectively represent *n*= the naturally occurring distribution of wax esters and *r*= the randomized distribution of wax esters resulting from rearrangements which occur during the reactions. It is to be noted that mixing of the reaction products from A and B will give emollients with a wide range of melting points, but will not be identical to the reaction product of C because of the absence of IV and V.

A process for producing an emollient may comprise the steps of:

- a) providing a composition comprising jojoba oil,
- b) adding an alcohol, e.g., having from 1 to 12 carbon atoms, to said composition,
- c) effecting alcoholysis on said jojoba oil mixed with said alcohol to produce an emollient, and
- d) effecting interesterification of remaining wax esters.

In preparing the emollient composition, refined jojoba oil (or hydrogenated jojoba oil or a mixture of the oil and hydrogenated oil) is introduced into an appropriate vessel (capable of excluding air) equipped with stirring and means of heating and cooling. The jojoba oil is first dried under vacuum at a temperature of 90 C to remove most or all moisture. The anhydrous isopropyl alcohol (or other alcohol) is then added with the amount of isopropyl used being from about 20 % to about 50% by weight of jojoba oil. The reactor is sealed and heat is applied to bring the temperature of the reaction mixture to about 70-75°C. It is important that air be excluded and that the reactor be vented through a condenser to recover any



unreacted alcohol. When the temperature has reached 70-75°C, a first addition of catalyst (e.g., a catalyst for alcoholysis and interesterification such as sodium methoxide) is made. The amount added ranges from about 0.05 or from 0.1 % to about 0.6 % by weight of the jojoba oil with about 0.3 % being preferred. After  
5 about 2 hours, a sample is taken and analyzed for the presence of the wax esters. If the wax ester content is greater than about 25% by weight, and it is desired to have a lower level of wax esters present in the reaction mixture, a second addition of catalyst is made, about 0.1% by weight of the original amount of jojoba oil. The reaction is then continued for an additional one hour. The reaction mixture is then  
10 sampled and analyzed again. If the residual wax ester content is less than about 25-35%, the reaction may be considered to be complete. Heating is discontinued but no cooling is applied. If the reaction is considered incomplete, a third catalyst addition may be made and the reaction continued as previously described. Any remaining catalyst can be neutralized and deactivated by the addition of citric acid.  
15 After about 15 minutes of agitation the neutralized catalyst (sodium citrate) is removed by filtration. Once the catalyst has been removed, any remaining isopropyl alcohol can be distilled from the product and the recovered isopropyl alcohol should be kept absolutely dry in order to be able to be used again.

As used in this description of the present invention, Floraesters 70 is **III**,  
20 Floraesters 15 is **IIr**, Floraesters 20, 30 and 60 are combinations of **IIr**, **IV**, **V**, and **IIIr**, Floraesters IPJ is a mixture of **IIr**, **VI**, and **VIII**, and Floraesters HIPJ is a combination of **IIIr**, **VII** and **IX**.

The emollient compositions of the invention may be used alone or with additives that may impart activity to the emollient or merely aesthetics to the  
25 emollient composition to be applied.

#### **DETAILED DESCRIPTION OF THE INVENTION**

Jojoba oil and its derivatives comprise a family of wax esters which have melting points which range from 10 to 71 °C. At room temperature (~20°C), this family of esters varies from pourable liquids, to soft creams, to pasty waxes,  
30 to a brittle hard wax. Jojoba esters may be used individually or can be blended with the different melting point esters within the family to form products with selected melting points and specific physical properties or feel. These esters, whether exclusively jojoba esters or when combined with other carrier and vehicle components (including other emollients or binders) can form excellent

carrier and vehicle or delivery compositions for use in the cosmetic, personal care and/or pharmaceutical field, including the cosmeceutical field where cosmetic compositions also provide pharmaceutical or other therapeutic benefits. Typical materials with which the jojoba esters may be blended in accordance

5 with the practice of the present invention include active materials and aesthetic materials (some of which materials may bridge both groups). These materials include, but are not limited to aesthetic materials such as colorants (especially colorants of dyes or pigments which do not persist on application to a subject, but merely decorate the commercial product) and fragrances (which may also be

10 active, as when used in aromatherapy). Active materials include, but are not limited to, cosmetic oils and waxes (both natural and synthetic, including hydrogenated or partially hydrogenated oils, vegetable oils (e.g., carrot oil), marine oils ~~such as squalene, silicone oils, mineral oils, and long chain esters~~), antibacterial agents, antifungal agents, antimicrobial agents in general, tooth and

15 gum treatment materials, analgesics, topical anesthetics, skin coloring agents (e.g., skin whitening agents), sun blocks (organic or inorganic ultraviolet radiation absorbing compounds), pesticides, insecticides, repellants, vitamins (especially vitamin E), hormones, proteins, long chain fatty acids, alcohols, cosmeceuticals, pigments, botanical extracts, esters and ethers, dimers, trimers,

20 oligomers, and polymers, and the like. Any new types of topical treatments or materials developed in the future would be reasonably applied by the emollient compositions of the present invention. These blended compositions may of course be combined with the active ingredients intended to be delivered by the compositions used in the present invention. The proportions of the jojoba esters

25 should be chosen to provide the dry-feel to the composition which is highly desired. This will usually require at least 10%, often at least 20%, preferably at least 30%, more preferably at least 40 or 50%, by weight, and most preferably at least 60, at least 70, at least 80, and at least 90% (up to 100% by weight) by weight of carrier material (excluding solvent and actives) in the composition.

30 The dry-feel compositions of the present invention may be applied to the skin as particulate materials, usually in a cosmetic, personal care, cosmeceutical or pharmaceutical composition. The processes of making the particles generally provides them as spherical or oblong particles, but they may be shaped by pressing, molding, spray drying, atomization or other stresses to provide shaped

particles, including platelets. The jojoba esters have particular properties which renders them especially suitable for use in fragrance dispensing compositions and topical applications, and those properties include their spreadability, emolliency, non-volatility, lack of color and lack of odor. The lack of odor is mildly important in pharmaceutical applications, but is viewed as particularly essential in the provision of fragrances. Perfume and cosmetic providers have extremely rigid standards on non-essential odor contribution in their products.

By skillful blending, a mixture of jojoba esters with fragrance oils can be prepared that melt at slightly below skin temperature. When formed into spherical particles and rubbed into the skin, these spherical particles disappear into the skin. Indeed they soften, melt and are adsorbed onto the surface of the skin where they deposit a layer of the jojoba esters containing fragrance. Jojoba esters are non-volatile and form an imperceptible film on the skin that slows down the release of the fragrance. These jojoba esters, being low in odor and superior skin emollients, provide an excellent carrier and delivery system for fine fragrances.

Spheres formed from the present invention which contain fragrance or perfume can be incorporated into a larger variety of cosmetic and personal care products for the purpose of providing emolliency to the skin. At the same time, these fragrances bearing spheres serve to deliver fragrance oils to the skin. Traditional methods of fragrance delivery utilize fragrance oils incorporated in alcohol, typically ethyl alcohol. These traditional carriers of fragrance oils are, by definition Volatile Organic Compounds (VOC's) which evaporate into the air after being applied to the skin. The present invention provides a method to deliver fragrance oils to the skin and minimize VOC emissions. Although jojoba oils are uniquely suited for the practice of the present invention, other natural oils, whether saturated or unsaturated, could be esterified and used in combination with the other ingredients of the compositions of the invention in less preferred embodiments. For example, coco oils could be used in place of or in combination with the jojoba oils during esterification.

Jojoba (*Simmondsia chinensis*) is a New World crop recently domesticated and now cultivated around the world in regions with a climate similar to the Sonora Desert of Arizona and northern Mexico where jojoba originated. Jojoba oil is extracted from the seed of the female jojoba bush. The oil is found in the

seed at levels normally exceeding 50% by weight but usually less than 55%.

This "oil" is not a triglyceride such as sesame or almond oils, but is instead a long chain ester, typically 42 carbons in length and composed of monounsaturated fatty acids combined with monounsaturated fatty alcohols.

- 5 The viscosity and appearance of jojoba oil are not unlike triglyceride oils although the tactile properties of jojoba oil render it an excellent "non oily" skin emollient. Jojoba has an unusual affinity for the skin. Unlike sesame oil or almond oil, jojoba oil is unusually resistant to oxidative degradation and rancidity. Jesuit missionaries in the southwestern USA and northern Mexico
- 10 recorded the use of jojoba oil by the indigenous people of the area as a treatment for wounds and as a hair preparation.

- Jojoba esters are prepared by processes described herein, which processes result in a randomized molecular combination of saturated with unsaturated jojoba fatty acids and fatty alcohols. These esters are a complex mixture of
- 15 different jojoba fatty acids and fatty alcohols combined randomly and composed of differing chain lengths. The fatty acids and fatty alcohols may be either fully saturated, monounsaturated or with both the fatty alcohol and the fatty acid containing one point of unsaturation, as described above. The melting point, consistency, and physical appearance of these jojoba esters can be manipulated
- 20 to produce a family of wax esters ranging from pourable liquids to hard, crystalline waxes.

- Jojoba esters are excellent carriers of fragrance oil. As fragrance oil carriers they are not prone to the development of rancidity or other unpleasant odors, resulting in delivery of the fragrance compound to consumers in a form as near
- 25 that created by the perfumer as possible. The physical form of the jojoba ester and fragrance oil system can be adjusted to accommodate any type of consumer product application desired. As an example, fragrance oils can be incorporated in liquid, pourable jojoba esters that at ambient temperatures can be used by a consumer in a manner similar to the traditional use of alcohol and fragrance oil
- 30 blends. Jojoba esters containing fragrance oil can be formed into spheres and these spheres subsequently incorporated into cosmetic bases with a wide range of physical and chemical properties. In this spherical form (as a discontinuous phase or dispersed phase), the jojoba esters serve to minimize the level of contact of the fragrance oil with the cosmetic base (as a continuous phase). This is a

desirable effect when the fragrance oil contains components that are not compatible with the cosmetic base, or vice versa. The particles are usually present as a dispersion of the particles in a flowable continuous phase carrying medium which is not a solvent for said particles. By flowable, it is meant that  
5 the carrying medium may be a liquid, higher viscosity fluid (such as a gel) or other material which can be spread by manual pressure in applications to the skin. The aspect of non-dissolvability of the particles within the carrying medium is desirable so that the particles do not dissolve into the carrying medium and destroy the dispersed nature of the combination. The combination  
10 may use a solvent carrier for the esters, if it is acceptable in the particular use to have the particles dissolved and the ester carried as a solute.

Individual jojoba esters or blends of the esters can be warmed to just above their melting point, ~~a fragrance oil incorporated, and then the molten blend~~  
poured into a jar or other dispersing package where it will solidify upon cooling.  
15 The consistency of the blended product in the container can be adjusted to facilitate its application to the skin by use of the fingers or by a method of application using the packaging material.

Fragrance oils are normally compounded to exhibit a range of natural volatility. Jojoba esters function as "fixatives" which help control the premature  
20 release of volatile components of fragrance oils. This "fixative" function of jojoba esters can be manipulated for optimum compatibility with different fragrance oils by skillful blending of jojoba esters of different melting points, without the jojoba oil reacting with the fragrance oil. Jojoba esters in the present invention are utilized as oxidatively stable carriers of fragrance oils and are  
25 capable of being modified or blended in different ratios to arrive at the optimum "skin feel" and "fixative" function that might be desired.

The emolliency of jojoba is well known to those skilled in the art of cosmetic formulation. When applied to the skin, jojoba esters function as emollients to preserve and retain the natural moisture levels in the skin. Unlike  
30 volatile alcohols, jojoba esters are non-drying and in fact soften and moisturize the skin. The use of these jojoba esters as carriers for delivery of fragrance oils results in lower VOC emissions, a fixative effect for the fragrance oils, and also results in enhancing the moisture level of skin to which the jojoba esters are

applied. When botanical extracts are incorporated with the jojoba esters, the esters also serve to disperse the botanicals evenly over the skin.

#### TYPICAL PROPERTIES OF JOJOBA ESTERS:

		Melting Point	Iodine Value
5	Floraesters - 70	66-70C	<2
	Floraesters - 60	56-60C	40-44
	Floraesters - 30	47-51C	57-61
	Floraesters - 20	42-48C	64-70
	Floraesters - 15	10-15C	78-85
10	Floraesters IPJ	6-12C	75-85
	Floraesters HIPJ	55-65C	<2

#### EXAMPLES

##### Formula 1.

- 15 Floraesters - 60 90 grams  
Fragrance Oil 10 grams

This blend of Jojoba Esters and fragrance oil melts at approximately skin temperature and if desired, can be formed into small spheres for direct application to the skin or for incorporation in other cosmetic base formulas.

##### 20 Formula 2.

- Floraesters - 15 60 grams  
Fragrance Oil 40 grams

This blend of Jojoba Esters and fragrance oil is liquid at ambient temperature and can be applied to the skin in the manner of traditional perfumes.

##### 25 Formula 3.

- Floresters - 60 75 grams  
Floraesters - 70 10 grams  
Fragrance Oil 15 grams

- 30 This blend of two Jojoba Esters plus fragrance oil melts at just above skin temperature and is suitable for direct application to the skin or can first be formed into spheres for subsequent incorporation in other cosmetic bases.

##### Formula 4.

- Floraesters - IPJ 25 grams  
Floraesters - 20 10 grams

Floraesters - 30 10 grams

Fragrance Oil 55 grams

This blend of three Jojoba Esters with fragrance oil has the consistency of a free flowing semi-solid paste. Application of stronger levels of fragrance which are long lasting on the skin are possible utilizing this carrier system.

**Formula 5.**

Floraesters 60 70 grams

Floraesters 30 5 grams

Floraesters 70 15 grams

10 Fragrance Oil 9 grams

FD&C Red #40 1 gram

This blend of three Jojoba Esters with fragrance oils is a non-flowing semi-solid which is appropriate for direct application to the skin. A pigment has been added to increase the visual impact of the invention.

**15 Formula 6.**

Floraesters 60 72 grams

Floraesters 70 16 grams

Fragrance Oil 10 grams

Ultramarine Blue 2 grams

20 This blend of two Jojoba Esters with fragrance oil includes a pigment selected for stability in high pH (greater than 8.0) aqueous cosmetic bases. This blend is suitable for formation into spheres and subsequent incorporation in cosmetic bases such as shower gels, facial creams, eye creams, body lotions, etc. The pigment has been selected for its compatibility with aqueous cosmetic bases.

25 Other compatible cosmetic ingredients may be added to any of the above formulas to achieve different melting points, flow characteristics, water resistance, etc. Examples of other cosmetic ingredients which may be suitable for addition to the above formulas are beeswax, castor wax, carnauba wax, vegetable oils, partially hydrogenated vegetable oils, surfactants such as Tween 60™ or  
30 Tween 80™, silicone preparations, fatty alcohols, fatty acids and fatty acid esters, alpha and beta hydroxy acids, vitamins (such as vitamin E, vitamin E acetate, vitamin A palmitate, beta caratene, vitamin C, etc.), herbal extracts, alpha-bisabolol, conjugated linolenic acid (CLA) antioxidants such as tocopherols or mixed natural tocopherols, other antioxidants such as BHA or

BHT. Pigments may also be added to any of the above to create unique visual effects. For example:

**Formula 7.**

	Floraesters 60	72 grams
5	Floraesters 70	8 grams
	Carnauba Wax	8 grams
	Fragrance Oil	10 grams
	Red D&C #30	2 grams

When formed into spheres and incorporated into low pH cosmetic bases such  
10 as cosmetic pancake, this blend of Jojoba Esters, carnauba wax, fragrance oil and pigment exhibits a resistance to softening and deterioration. Inclusion of the carnauba wax results in an even more dry feeling on the skin. This formula would be more appropriate as a fragrance delivery for individuals with oily skin.

**SKIN MOISTURE DETERMINATIONS**

15 The NOVA meter is an instrument designed to measure skin moisture. During a period of one week the instrument was used to determine a baseline moisture reading for an area of skin on the forearm approximately 4 inches above the wrist. Readings taken during the one-week period established the baseline at a reading of 101 units (as measured, for example, by a NOVA DPM  
20 9003 instrumen, which measures impedance or the capacitive reactance of the skin, cf. The NOVA™ Technology Corporation *Newsletter*, Summer 1997) for the panelists. A higher reading indicates a more moist skin, a lower reading indicates a drier skin. The area of skin to be tested was divided laterally and marked with a pen to delineate the two skin testing areas. A 30% solution of  
25 fragrance oil (Shaw Mudge M-7108) in ethanol was prepared for application to one of the skin test areas. Formula 3 in the preceding examples was prepared for application to the other skin test area. NOVA meter readings were taken in each test area 10 minutes after application of the test materials, 30 minutes after application, one hour and three hours after application. Readings were taken in  
30 triplicate and the average taken and recorded as the result below:



NOVA meter reading

Alcoholic fragrance treated    Jojoba Ester treated

Composition No. 3

	Baseline during one week	101	101
5	Ten minutes after application	96	104
	Thirty minutes after application	96	108
	One hour after application	98	114
	Three hours after application	98	106

- 10        Where the solvent effects of the ethanol in the alcoholic fragrance treated skin caused a decrease in the moisture content of the treated area, the jojoba ester treated skin exhibited an increase in skin moisture.

These ~~and other~~ aspects of the invention ~~will be~~ further described and enabled in the practice of the following, non-limiting examples.

15    **EXAMPLES**

Example 1 A moisturizer composition, in the form of the dry-feel emollient compositions of the present invention in spherical particle form, was prepared as follows. The following distinct phases or compositions were used in the preparation.

20	Deionized water	57.85
	Disodium ethylenediaminetetraacetic acid	00.03
	Carbopol™ 981 (Carbomer, B. F. Goodrich)	00.25
	A1. Glycerine 96% (Dow)	05.00
	Polyglycol 1450 (PEG) (Dow)	03.50
25	Sorbitol 70	03.00
	Methylparaben (USP)	00.20
	Germall 115 (Imidazolidinyl urea, Sutton)	00.10
	Sodium Dehydroacetate	00.05
	B. Deionized water	05.00
30	Triethanolamine	00.70
	C. Florasun 90 (Hybrid sunflower seed oil)	05.00
	Floraesters 30 (jojoba ester)	03.10
	Softisan 100 (hydrogenated coco-glycerides, Huls)	02.00
	Jojoba oil	

	(refined grade, International Flora Technologies)	03.00
	Lexemul 561 (glyceryl stearate and PEG-100 stearate, Inolex™)	02.50
	Shea Butter (Tri-K)	01.50
5	SF-1256 Fluid (Cyclomethicone, GE)	01.50
	Pristerene 4911 (stearic acid, unichema)	02.20
	Vitamin E acetate (tocopheryl acetate, Roche)	00.20
	Propylparaben, USP	00.10
	D. Vitamin A palmitate with vitamin B-3 (Roche)	00.02
10	Fragrance, (Shaw Mudge M-7323)	00.20
	E. Particulate emollients with 5% by weight B-carotene	03.00

The water of phase A was heated to 80°C. Using high speed propeller agitation, the Carbopol 981 was sprinkled into the A phase. Once all of the Carbomer has been wetted out, mixing was continued for 15-20 minutes at 75°C. The remaining ingredients of phase A were then added. The ingredients of phase A1 were combined and then added to phase A. The ingredients of phase B were combined and then added to the combined phases A and A1. With medium propeller agitation. Phase C was heated to 75°C with medium propeller stirring then added to the combined phases A, A1 and B with medium propeller stirring at 75°C for 15 to 20 minutes. The mixture was cooled to 45°C with stirring. Phase D was added to the blended phase A, B and C with medium propeller stirring for 15-20 minutes until the mixture appeared to be uniform. The batch was cooled to 30°C and phase E was blended in with slow sweep agitation until the mixture appeared to be uniform.

**Example 2** An aqueous gel system of suspended solid emollient particles according to the present invention was prepared as follows. The following distinct phases or compositions were used in the preparation.

	Deionized water	90.29
30	Disodium ethylenediaminetetraacetic acid	00.03
	Carbopol™ 981 (Carbomer, B. F. Goodrich)	00.50
	B. Propylene glycol, USP	03.00
	Propylparaben, USP	00.05

	Methylparaben (USP)	00.25
	Germall 115 (Imidazolidinyl urea, Sutton)	00.25
	Sodium Dehydroacetate	00.03
	C. Jojoba Wax PEG-120 esters	00.30
5	dl-Panthenol	00.50
	Lubrajel™ MS (polyglycolmethacrylate, Guardian)	01.00
	D. Triethanolamine	00.80
	E. Particulate emollients with 5% by weight Vitamin E acetate	03.00

- 10 The Carbopol was dispersed into the water of phase A with high speed propeller mixing and heated to 70°C. The EDTA was added with propeller agitation until dissolved. The ingredients of phase B were added into phase A while mixing at 65-70°C. Phase C was added into this resulting mixture with moderate propeller agitation. The batch was force cooled, and then with moderate sweep agitation,
- 15 phase D was added to the batch. pH adjustment to between about 6.8 – 7.2 was useful. The particulate emollient system of the invention was blended in with sweep agitation.

This example could be repeated easily with the Vitamin E acetate replaced with corresponding amounts of botanicals or other additives such as Vitamin C,

20 calendula, ginko balboa, and the like.

## WHAT IS CLAIMED

1. A composition comprising solid particles of synthetically esterified natural plant organic oils carrying an active ingredients selected from the group consisting of colorants, fragrances, oils, waxes, antimicrobial agents, tooth and gum treatment materials, analgesics, topical anesthetics, skin whitening agents, sun blocks, pesticides, insecticides, repellants, vitamins, hormones, proteins, long chain fatty acids, alcohols, cosmeceuticals, botanical extracts, esters, ethers, dimers, trimers, oligomers, and polymers.
2. A composition comprising solid particles of jojoba esters carrying an active ingredient selected from the group consisting of colorants, fragrances, oils, waxes, antimicrobial agents, tooth and gum treatment materials, analgesics, topical anesthetics, skin whitening agents, sun blocks, pesticides, insecticides, repellants, vitamins, hormones, proteins, long chain fatty acids, alcohols, cosmeceuticals, botanical extracts, esters, ethers, dimers, trimers, oligomers, and polymers.
3. The composition of claim 1 wherein said solid particles comprise dyed or pigmented jojoba esters carrying an active ingredient selected from the group consisting of fragrances, vitamins, medicaments, hormones, botanical extracts and ultraviolet radiation absorbers.
4. The composition of claims 2 or 3 wherein said jojoba esters comprise at least 10% by weight of said particles.
5. The composition of claims 1, 2 or 3 comprising said particles dispersed in a flowable continuous phase carrying medium which is not a solvent for said particles.
6. The composition of claim 2 comprising said particles dispersed in a flowable continuous phase carrying medium which is not a solvent for said particles.

7. The composition of claim 4 comprising said particles dispersed in a gel carrying medium which is not a solvent for said particles.
8. The composition of claims 1, 2 or 3 comprising said particles dispersed in a cosmetic pancake carrying medium.
9. The composition of claim 4 comprising said particles dispersed in a cosmetic pancake carrying medium.
10. The composition of claims 2 or 3 wherein said particles comprise at least 50% by weight of said jojoba esters.
11. The composition of claim 4 wherein said particles comprise at least 50% by weight of said jojoba esters.
12. The composition of claims 2 or 3 wherein said jojoba esters comprise at least 60% by weight of said particles and comprise jojoba esters having at least some components selected from the group consisting of at least one of the general formulae:
  - a)  $R^1 - \text{COO} - \text{CH}_2 - R^2$  and/or  $R^2 - \text{COO} - \text{CH}_2 - R^1$ ,
  - b)  $R^1 - \text{COO} - R^4$  and/or  $R^2 - \text{COO} - R^4$  and
  - c)  $R^1 \text{CH}_2 - \text{OH}$  and/or  $R^2 \text{CH}_2 - \text{OH}$ ,
 wherein  $R^4$  comprises  $\text{C}_n \text{H}_{2n+1}$ ;  $n=1$  to 12  
 $R^1$  comprises  $\text{CH}_3 - (\text{CH}_2)_7 - \text{CH} = \text{CH} - \text{CH}_2 - (\text{CH}_2)_x -$ , and  
 $R^2$  comprises  $\text{CH}_3 - (\text{CH}_2)_y -$   
 wherein  $x$  is 6, 8, 10 and/or 12, and  $y$  is 16, 18, 20 and/or 22.
13. The composition of claim 12 wherein  $R^4$  comprises an *iso*-propyl group.
14. A process for the manufacture of a blend of esters comprising effecting an alcoholysis reaction between jojoba oil and an alcohol in the presence of a base catalyst.
15. The process of claim 14 wherein said blend of esters comprises at least one of ester within a), b), and c) wherein:

a) comprises  $R^1 - \text{COO} - \text{CH}_2 - R^2$  and/or  $R^2 - \text{COO} - \text{CH}_2 - R^1$ ,

b) comprises  $R^1 - \text{COO} - R^4$  and/or  $R^2 - \text{COO} - R^4$  and

c) comprises  $R^1 \text{CH}_2 - \text{OH}$  and/or  $R^2 \text{CH}_2 - \text{OH}$ ,

wherein  $R^4$  comprises  $\text{C}_n \text{H}_{2n+1}$ ;  $n=1$  to  $12$

5  $R^1$  comprises  $\text{CH}_3 - (\text{CH}_2)_7 - \text{CH} = \text{CH} - \text{CH}_2 - (\text{CH}_2)_x -$ , and

$R^2$  comprises  $\text{CH}_3 - (\text{CH}_2)_y -$

wherein  $x$  is 6, 8, 10 and/or 12, and  $y$  is 16, 18, 20 and/or 22.

16. The process of claim 15 wherein said alcohol comprises *iso*-propyl alcohol.

10

17. A process for manufacturing a blend of esters comprising the steps of:

a) providing a composition comprising jojoba oil,

b) adding an alcohol having from 1 to 12 carbon atoms to said composition,

15 c) effecting alcoholysis on said jojoba oil with said alcohol to produce an emollient, and

d) effecting interesterification of at least some remaining wax esters.

18. The process of claim 17 wherein said alcoholysis is performed in the presence of a base catalyst and *sio*-propyl alcohol.

20

19. The composition of claims 2 or 3 wherein said solid particles comprise spheres.